

## SERVICE INNOVATION IN THE DIGITAL AGE: KEY CONTRIBUTIONS AND FUTURE DIRECTIONS

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### Introduction

Over the last decade, there has been an increasing focus on service across socioeconomic sectors coupled with transformational developments in information and communication technologies (ICTs). Together these developments are engendering dramatic new opportunities for service innovation, the study of which is both timely and important. Fully understanding these opportunities challenges us to question conventional approaches that construe service as a distinctive form of socioeconomic exchange (i.e., as services) and to reconsider what *service* means and thus how *service innovation* may develop. The aim of this special issue, therefore, is to bring together some of the latest scholarship from the Marketing and Information Systems disciplines to advance theoretical developments on service innovation in a digital age.

The prevalence of service across socioeconomic sectors arises from a number of intersecting trends. One is growth in what has been classified traditionally as the services industries and professions (Bryson et al. 2004). As standards of living rise in developed and developing economies, citizens' expecta-

tions and demand for personal services such as healthcare, education, and entertainment increase, fueling growth in the personal services sector. At the same time, the complexity of intra-organizational structures and interorganizational value networks create new demands for professional coordination services internal to the firm (e.g., supply chain management) or outsourced to specialized firms (e.g., supply chain mediation, third and fourth party logistics, professional service firms). Such changes are closely aligned with globalization that stimulates the growth of outsourcing services as well as with governmental services aimed at economic and environmental regulation and compliance.

Moreover, across the business landscape large companies have embraced service as an engine of their firms' growth. For example, as part of the reinvention of a century-old company, IBM transformed from a business model that (primarily) depended on selling computer equipment and software to a model that relies on providing services and on innovation in service for its competitive advantage and growth (Spohrer and Maglio 2010). Companies like Salesforce.com have led the way by innovating new IT-

enabled service models, such as providing software as a service to customers (rather than as a licensed software product). Transformative new services in developing economies have demonstrated how service innovation can drive economic development despite limited societal infrastructure or resources. A dramatic example is the M-Pesa money transfer service, which has significantly improved the lives of millions of Kenyans and others across Africa who were previously locked out of the financial system but who now have access to an increasing array of financial services through a mobile infrastructure.

Fundamental to many of these service innovations are the rapid developments and widespread deployment of ICTs. The importance of ICTs to firms and industries in service sectors and to service innovation generally has long been recognized (Barras 1986). In these traditional approaches to service innovation, ICTs have been understood as technological tools in the service delivery process, which contribute to productivity and efficiency of service firms and which may, over time, lead to entirely new markets or categories of services (Barras 1990). In contrast to these earlier perspectives that distinguish *innovation in services industries* from service innovation or innovation generally, other theorists have posited that all economic exchanges are essentially service exchanges, and that ICTs have a fundamental and transformative role as resources in service innovation (Lusch and Vargo 2014; Vargo and Lusch 2004, 2008a, 2008b). From this perspective, ICTs combine with other resources (such as skills and knowledge) to allow information to be transported and repackaged in different contexts to create new opportunities for service exchange and for innovation (Lusch and Vargo 2014). Similarly, recent work on digital infrastructure (Tillson et al. 2010) has highlighted the generative nature of digital technologies (Henfridsson and Byzstad 2013), which may facilitate a combinatorial potential for service innovation (Yoo et al. 2012). Along with other theoretical perspectives we consider shortly, these views suggest new ways of understanding service as we seek to develop new knowledge about service innovation in the digital age.

In the following pages, we set the stage for this special issue by first reviewing key insights from the service innovation literature, which has provided a foundation for much IS research relevant to service innovation, and highlight salient contributions from the IS literature to date. Moving beyond these more traditional approaches, we argue that the theoretical approaches and themes, which inform the articles in this special issue, can provide additional insights and direction for future study of service innovation. We highlight contributions developed in this special issue and conclude with suggestions for further study.

## Approaches to Theorizing Service Innovation

The study of innovation is no longer synonymous with a sole focus on new product innovations (Sawhney et al. 2006). Instead, the notion of *services* (or *service products*; see Barras 1990) as key to growth of the so-called *service economy* is central to some approaches to service innovation. In some of the literature, service innovations are viewed as primarily market driven, so that their introduction results in differentiation of the firm's output (often service products) for its customers or clients (Abernathy and Utterback 1978; Damanpour and Gopalakrishnan 2001). In this way, services offered by organizations in the service sector are conceptualized to be similar to products introduced by manufacturing organizations (Miles 2001; Sirilli and Evangelista 1998). As with product innovation, the drivers of service innovations are then construed as arising mainly from clients' demand for new services and executives' desire to create new services for existing markets or to find new market niches for existing services (Damanpour et al. 2009; Matthews and Shulman 2005).

However, there has been an increasing focus on service innovation as distinctive from product innovation (Barras 1986, 1990; Damanpour et al. 2009; Gallouj 2002; Miles 2001, 2008). That research has suggested that the prevailing views of product innovation that follow a technological trajectory (Abernathy and Utterback, 1978; Anderson and Tushman, 1991) do not explain well innovations in service organizations (Damanpour et al. 2009). Barras' (1986) highly influential "reverse product cycle" model emphasized the different patterns of innovation in the service industries and recognized the integral role of information systems. In his phased model, Barras suggests that, first, service organizations use an adopted technology (such as an ICT) for service improvement to increase the efficiency of existing services. In the second phase, the technology is applied to improving the quality and effectiveness of the services. In the third phase, the technology assists in generating wholly transformed or new services (Barras 1986, 1990). While earlier work focused on service innovation in vanguard industries such as financial services (Barras 1986, 1990), service innovation has grown and developed albeit at different rates across industries spanning healthcare, education, entertainment, and many others. There have also been significant developments in public sector services, where open standards and architecture are facilitating disintegration of services and their re-aggregation around what has been termed *service ecosystems* (Fishenden and Thompson 2012). Service innovation in other sectors, such as the legal sector (Sako 2009, 2010), has examined how digital innovation facilitates the disintegration of global value chains by understanding how firms apply modularity or break down their value chain with the rapid

growth of new service providers. For example, law firms and corporations are increasingly seeking legal support services from outside legal entities such as legal processing outsourcing providers, which have grown rapidly from a \$440 million business in 2007 to an \$860 million business in 2011.

Consistent with such service logic, Den Hertog (2000) recognized four dimensions of service innovation (novelty), namely in service concept, client interface, service delivery system, and technology, with many service innovations involving some combination of these four dimensions (Miles 2008). For example, a new service will often require a new service delivery system and changes to the client interface. Service innovation in one dimension may also trigger the need for changes in other dimensions within and across firms in a sector. For instance, the diffusion of video recording equipment allowed individuals to view movies in their homes rather than in a movie theater (service concept, client interface), but doing so required movie distributors to utilize new service delivery media (e.g., VHS tapes, DVDs) (technology) delivered through new channels such as video stores or online viewing services (service delivery system, technology).

Others have argued that because services are performed for particular clients in a particular circumstance, service innovation should be examined as emergent, interactive, and dynamic, as well as knowledge and information intensive as communication flows between providers and customers (Miles 2008, p. 117). As a result, service innovation can emerge as *ad hoc* innovation arising in service exchanges as well as through *anticipatory* innovations (when service providers develop new spheres of knowledge) or *formalization* of standardized procedures across multiple service provider/client interactions (Gallouj 2002, p. 20). These latter views are particularly relevant to knowledge-intensive services in which service providers customize services for each client, and over time develop new portfolios of services for a marketplace (Barras 1990; Gallouj 2002). Barras highlights the interactive nature of the service innovation process in which the focal innovation emerges and develops along with technological changes and shifts in market conditions and industry structures within the adopting sector. Through such an interactive process he argues that wholly new markets open up for the new services.

Professional service firms, in which firms depend on knowledge as an important strategic resource (Lowendahl et al. 2003), illustrate these varied aspects of service innovation. Through client interaction and coproduction of knowledge with business partners, professional service firms are able to improve their knowledge development processes for value creation (Dougherty 2004; Fosstenlokken et al. 2003; Gann and Salter 2000). Service innovation in professional service

firms such as management consultancy and law firms involves creating new practice areas (Anand et al. 2007; Gardner et al. 2008) and leveraging of the Internet to develop new online assurance services (Barrett and Gendron 2006; Gendron and Barrett 2004) in order to diversify into new markets. For example, WebTrust, a seal of assurance certifying a client's best practice to online consumers, was developed in the early 2000s as a service innovation by accounting firms and institutes to leverage and build upon their expertise to create a new market in online assurance. More recently, Sako (2009, 2010) studied service innovation in law firms, examining how they made decisions about which services to retain within the firm and which legal services to outsource or offshore to other firms. Information and communication technologies are central to the delivery of these professional services through these new business models, which have implications for the structure and culture of law firms, and their wider institutional practices (Sako 2010).

These various approaches to theorizing service innovation share the concept of services as distinctive from products (or goods). In contrast, some theorists have argued that distinctions between products and services may not be meaningful, as products require service (at least, self service) and services generally involve some form of product or artifact (Bryson et al. 2004; Gustafsson and Johnson 2003; von Nordenflycht 2010). This intermingling of products (artifacts) and service offerings is evident, for instance, in the growing trend toward servitization (Neely 2008; Vandermerwe and Rada 1988) and has become a major development in the information technology (IT) field. For instance, at its most basic level, cloud computing entails firms selling *computing* rather than *computers* to clients. Servitization strategies allow an organization to shift from selling a product to selling an integrated product and service offering. A classic example is Rolls Royce, the first provider in the aircraft engine industry to adopt a servitization strategy. Instead of simply selling engines to their customers (e.g., airlines), Rolls Royce developed a product-service system (Neely 2008) in which they manufactured and retained ownership of the engines and contracted to customers a managed service around a new business model of "power by the hour." Simply put, the customer no longer buys the engine as a product but the power the engine delivers. To successfully deploy this service model, Rolls Royce has leveraged digital innovations around analytics and the "Internet of Things." Specifically, they have successfully deployed sensor-based digital technologies on the turbine blades of their aircraft engines to trace and track engine performance from real-time analytics centers.

Moving beyond these theoretical positions, Vargo and Lusch (2004, 2008a, 2008b) have argued for an alternative, transcending, service-centered logic, which has been implied in

the combined work of various scholars for decades. With the collaboration of scholars from diverse disciplines, this service-dominant (S-D) logic has begun to solidify and resonate and is increasingly being used as a foundation for understanding innovation in general. S-D logic begins with the reconceptualization of *service* (singular) as a *process* of using one's resources (e.g., knowledge) for someone's (self or other) benefit as compared with the more traditional conceptualization of *services* (usually plural) as a *unit of output* (i.e., an intangible product). The resources used in this service provision are created through the integration of existing resources (Vargo and Lusch 2008a, 2008b; see also Normann 2001), typically acquired through service exchange. This resource-integrating, service-exchange activity, coordinated through institutional arrangements for mutual value creation, establishes *service ecosystems*, which are relatively self-contained, self-adjusting systems of resource-integrating actors connected by shared institutional logic and mutual value creation (Lusch and Vargo 2014). Information technology plays a central role in the formation and functioning of service ecosystems and thus in service innovation, as resources (importantly, information, skills, and knowledge) are combined and exchanged in new ways that create value for those actors engaged in the exchange.

This brief review highlights the spectrum of theoretical approaches to service innovation, building from traditional views of service products offered to clients in an organization or market to the reconceptualization of service as value co-creation in exchanges between resource integrating actors of S-D logic. Although these approaches differ in how service and service innovation are theorized, a consistent message is the importance of ICTs in service innovation—as a technological tool, a transformative market development, and an essential resource. Thus, for an academic field dedicated to the study of how ICTs are developed and applied in social and organizational settings, we suggest that service innovation is a critical area for IS research contribution to knowledge. As such, in the next section, we start by taking stock of the IS literature and how much research has been largely implicit in addressing the topic of service innovation.

## Insights on Service Innovation in IS Research

Although only a few IS publications claim the specific banner of “service innovation,” much research in the information systems field can be related in some manner to the quest to better understand service innovation. These works largely build on the concepts of service innovation outline above. For instance, information systems have been characterized as

service offerings provided to firms by an internal organization (the IS function) or by external sources (IT vendors, IS service outsourcers). A wealth of IS research (theoretically focused as well as practice-based research) has investigated how IS services are improved, even transformed, within organizations and over time through new practices and new technologies. Other IS research streams have examined how the infusing of ICTs into intra- or interorganizational activities influences the ways in which service processes, firms, supply chains, and markets operate. Moreover, organizations in the services sectors frequently provide the settings for IS research on phenomena of interest to the IS field, both industries that have relied on ICTs for some time, such as in retail, travel, finance, and insurance, as well as sectors that more recently are experiencing significant changes related to ICTs, such as entertainment, education, government, and healthcare.

While we do not aspire to produce a comprehensive literature review, we consider briefly some common themes, highlighted in Table 1, which illustrate how the IS literature has contributed to our understanding of service and service innovation over the last decade. For simplicity of presentation, we organize this discussion along Den Hertog's (2000) four dimensions of novelty in service concept, client interface, service delivery system (intra-organizational and inter-organizational), and technology.

## Service Concept

Much IS research is rooted in customary understandings of service as activities that a service provider performs for a user or customer, and of services as the bundle of more-or-less routinized activities that characterize provider/user relationships (Rai and Sambamurthy 2006). For instance, information systems have been characterized as information services, which can contribute to innovation in administrative processes, technological processes, technological services, and technological integration (Lyttinen and Rose 2003). Mathiasen and Sorensen (2008) examined types of information service provided by ICTs as computational, adaptive, networking, and collaborative processing capabilities. When viewed as bundles of information services an IS organization provides to its customers (users), organizational information systems have been assessed in terms of service metrics (e.g., IS ServQual) for service quality (Ketinger and Lee 2005) and user satisfaction (Sun et al. 2012) with the combined service/system. IS researchers have adopted similar evaluation approaches to study new ICT-enabled services available to individuals via the Internet. The technical specifications of new ICT services are not typically addressed in IS theory journals, where IS researchers instead theorize about how users interact with new ICT-enabled services (see Poston and

**Table 1. Examples of IS Research Streams with Implications for Service Innovation**

Opportunity for Service Innovation	Examples of IS Research Topics Related to Service and Service Innovation
<p><b>Service concept:</b></p> <ul style="list-style-type: none"> <li>• What is (the) service?</li> <li>• How is service evaluated?</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Organizational IS</li> <li>• Automated agents (e.g., Kayak.com)</li> <li>• IS services (ASP, SaaS, IaaS, etc.)</li> </ul>	<p><b>Categorizing information services:</b></p> <ul style="list-style-type: none"> <li>• Information services in administrative processes, technological processes, technological services, and technological integration innovations (Lytinen and Rose 2003)</li> <li>• Information services as computational, adaptive, networking and collaborative processing capabilities (Mathiassen and Sorensen 2008)</li> <li>• Cloud computing as "desires" (Venters and Whitley (2012)</li> </ul> <p><b>Measures of information services:</b></p> <ul style="list-style-type: none"> <li>• Information services quality (IS ServQual) (Kettinger and Lee 2005)</li> <li>• User satisfaction with information services (Sun et al. 2012; Susaria et al. 2003)</li> </ul> <p><b>Automated/autonomous personalized information services:</b></p> <ul style="list-style-type: none"> <li>• Recommender systems (Liang et al. 2007; Poston and Speier 2005; Xiao and Benbasat 2007)</li> </ul>
<p><b>Client interface:</b></p> <ul style="list-style-type: none"> <li>• How do users/ provider interact?</li> <li>• How is self-service conducted?</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Web-based services</li> <li>• Internet/mobile self service (e.g., airline check in)</li> </ul>	<p><b>Human-computer interaction in ICT-enabled service systems:</b></p> <ul style="list-style-type: none"> <li>• User experience and perception of information systems and services in e-commerce (Kettinger and Lee 2005; Sun et al. 2012; Tan et al. 2003; Xu et al. 2013)</li> </ul> <p><b>Process design and automation in customer/provider interactions:</b></p> <ul style="list-style-type: none"> <li>• Firm-level effects of self-service on client relationships (Ba et al. 2010; Scherer et al. 2015)</li> <li>• Enactments of self service (Germonprez et al. 2011; Schultze and Orlikowski 2004)</li> </ul>
<p><b>Intra-organizational service delivery system:</b></p> <ul style="list-style-type: none"> <li>• How is knowledge integrated in service activities?</li> <li>• Are service processes changed?</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Knowledge management systems (e.g., Yammer)</li> <li>• Business processes (e.g., customer service)</li> </ul>	<p><b>ICT-enabled knowledge processes in firms:</b></p> <ul style="list-style-type: none"> <li>• Individual-level work improvement via knowledge sharing (Gray et al. 2011)</li> <li>• ICT implications on organizational communications (Leonardi 2013)</li> <li>• ICT-enabled innovation through knowledge exchange and absorptive capacity (Carlo et al. 2012; Joshi et al. 2010; Slaughter and Kirsch 2006)</li> <li>• ICT-enabled integration of multidisciplinary services (Oborn et al. 2011)</li> </ul> <p><b>ICTs implications for services sector organizations:</b></p> <ul style="list-style-type: none"> <li>• Service processes in healthcare settings (Aron et al. 2011; Barrett et al. 2012; Chen et al. 2011; Goh et al. 2011; Miscione 2007; Mukhopadhyay et al. 2011)</li> <li>• Impact on financial performance of firms (Setia et al. 2011)</li> <li>• Mobile technology in service professionals' roles (Dery et al. 2014; Leclercq-Vandelannoitte et al. 2014)</li> </ul>
<p><b>Interorganizational service delivery system:</b></p> <ul style="list-style-type: none"> <li>• How do firms in supply chains interact?</li> <li>• How are services sourced?</li> <li>• Does ICT affect value in networks?</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Supply chain management</li> <li>• Global services outsourcing (e.g., IT services)</li> </ul>	<p><b>Sourcing and outsourcing of services in markets or networks:</b></p> <ul style="list-style-type: none"> <li>• Global disaggregation in service occupations (Mithas and Whitaker 2007)</li> <li>• Sourcing IT services (Chang and Gurbaxani 2012; Tanriverdi et al. 2007)</li> <li>• Specialization in ICT-enabled global supply chains (Chang and Gurbaxani 2012).</li> <li>• Information technology innovation transfer (Gu et al. 2007)</li> <li>• Sourcing mechanisms with modular process design (Tanriverdi et al. 2007)</li> </ul> <p><b>ICT-effects in networked firm interactions:</b></p> <ul style="list-style-type: none"> <li>• IT integration in supply chains (Dong et al. 2009)</li> <li>• IT in relational value (Grover and Kohli 2012; Rai et al. 2012)</li> <li>• Standard electronic business interfaces in service industries (Malhotra et al. 2007; Markus et al. 2006)</li> <li>• Service supply chain cooperatives (Sarker et al. 2012; Soh et al. 2006)</li> </ul> <p><b>ICT-effects on value creation in markets or networks:</b></p> <ul style="list-style-type: none"> <li>• Implications for firm value through network participation (Ceccagnoli et al. 2012; Han et al. 2012)</li> <li>• Information intermediaries and firm/market performance (Ghose et al. 2007).</li> </ul>
<p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• How might digital technology embedded in products enable innovation in service systems?</li> <li>• How can the paradox of generativity and control of digital infrastructure be managed within service systems?</li> </ul> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• Standards, layered architecture</li> <li>• Digital platforms (e.g., iOS, Android, cloud computing)</li> </ul>	<p><b>Digital innovation:</b></p> <ul style="list-style-type: none"> <li>• Implications of the layered modular architecture of digital innovation for servitization (Neely 2008; Yoo et al. 2010)</li> </ul> <p><b>Digital Infrastructure and standards:</b></p> <ul style="list-style-type: none"> <li>• Standards for information services (Braa et al. 2007; Grisot et al. 2014; Lytinen and King 2006; Steinfield et al. 2005)</li> <li>• Open standards and architecture allow redesign of service ecosystems (Fishenden and Thompson 2012)</li> </ul> <p><b>Platforms and ecosystems:</b></p> <ul style="list-style-type: none"> <li>• Digital infrastructure allows for generativity and creates value through platforms (Cusumano 2012; Henfridsson and Byzstad 2013; Zittrain 2006)</li> <li>• Boundary resources may resolve paradox of generativity and control in service ecosystems (Ghazawneh and Henfridsson 2013)</li> </ul>

Speier 2005; Xiao and Benbasat 2007) and their perceptions of service quality, utility, and satisfaction. In contrast, Venters and Whitley (2012) adopt the perspective of IS managers to describe their *desires* for cloud computing services in terms of value or usefulness, such as equivalence of performance at lower relative cost and scalability to meet demand.

### Client Interface

Customer self-service is of much interest in the service management literature and ICT-enabled self-service has been viewed as an opportunity for service innovation leading to greater efficiency, cost reduction, and potentially convenience for customers (see Bitner et al. 2000; Meuter et al. 2005). Some degree of self-service is implicit in automated customer interface systems for electronic commerce, e-government, customer support, and so on. In IS studies, users' evaluation of service quality is of interest in human-computer interaction (HCI) research that examines the client interface in ICT-enabled services. For instance in a study of service quality in e-government websites, Tan et al. (2003) differentiated between service content (what) and service delivery (how) in ICT-enabled service interactions, whereas Xu et al. (2013) proposed an integrated model of perceived service, information, and system quality for IS service quality of web-based services.

IS studies have also indicated that over-reliance on self-service automation risks lowering customer satisfaction (Ba et al. 2010) and that a mix of self-service and human-service channels helps maintain customer loyalty and retention (Scherer et al. 2015). Schultze and Orlikowski (2004) highlighted disruptions to long-standing customers' and sales representatives' relationships that may develop with reliance on self-service in interorganizational business-to-business (B2B) relationships.

### Intra-Organizational Service Delivery Systems

Much IS research has examined how information systems influence the processes and practices through which service workers perform tasks for the organization or its clients and customers. Knowledge sharing processes are often investigated as the underlying mechanisms for innovation and improvement (Gray et al. 2011; Leonardi 2013; Oborn et al. 2011). ICT use is assumed to enhance knowledge processes (Barrett et al. 2004), and the absorptive capacity of the firm, enabling the firm to produce innovations and remain competitive (Joshi et al. 2010; Ray et al. 2005; Sherif and Menon 2004). For instance, Carlo et al. (2012) examined firm-level

innovation in terms of knowledge processes, in which knowledge mediated by routines contributes to innovation and absorptive capacity. Slaughter and Kirsch (2006) approached service innovation in terms of knowledge transfers between parties adopting software process improvements. On the other hand, the "knowing in practice" perspective (Orlikowski 2002) questioned whether knowledge can be transferred (Walsham 2002) and emphasized knowledge enactment in practices. In this vein, Miscione's (2007) study of a health-care service innovation highlighted how the introduction of a telehealth service in rural Peru encountered a mix and resistance of local knowledge and practices to knowledge and practice developed in urban healthcare settings and transferred via the telehealth platform, limiting effective system use and enhancement of health services.

ICTs have long been associated with the potential for innovation in services industries (Barras 1990). IS researchers have examined ICT-related changes in a variety of organizations in services industries such as travel, insurance, finance, retail, and healthcare. Following Barras's reverse innovation cycle, much IS research examines how the introduction of ICTs (i.e., technology change) may lead to opportunities for improving existing services or even new services (Aron et al. 2011; Maldonado 2010; Mukhopadhyay et al. 2011; Setia et al. 2011). Researchers have also illustrated how ICT-enabled changes can disrupt how professionals carry out service work (see Dery et al. 2014; Leclercq-Vandelannoitte et al. 2014). For instance, in a study of the introduction of a robot into pharmacy operations, Barrett et al. (2012) examined how the boundaries of professional practices, identities, skills, and status were entangled with and reconfigured by the materiality of the robot.

### Interorganizational Service Delivery Systems

The need for new or extended interfirm services arises from increasing globalization, outsourcing, and supply chain management practices (Bryson et al. 2004). In this regard, the potential for ICT-enabled service innovation extends beyond an organization's internal service delivery systems to interorganizational service delivery systems. The implications of ICTs for these types of service innovations have been examined in the IS literature in economic studies of global sourcing of IT services as a factor influencing IT industry profitability (Chang and Gurbaxani 2012; Tanriverdi et al. 2007) or of knowledge specialization that enhances the value of IT services to firms (Chang and Gurbaxani 2012; Gu et al. 2007). However, not all services are equally subject to globalization. Mithas and Whitaker (2007) argued that codification, standardization, and modularization of service activities along with separation of physical and information flows

via ICTs mediates the extent to which information-intensive service occupations (such as IT professionals) will be subject to globalization.

The IS literature has also examined how ICTs are essential components in coordination services within supply chain networks (of products and services), for instance by enabling information exchange through e-business interfaces (Malhotra et al. 2007; Markus et al. 2006) or enabling firms in a network to integrate resources to generate greater value for the firm or the market (Dong et al. 2009; Grover and Kohli 2012; Rai et al. 2012). Beyond supply chains, information economics studies have explored how ICT innovations can alter the ways in which markets function and thus how firm value is created or distributed in a market (Ceccagnoli et al. 2012; Han et al. 2012). For example, in a study of an Internet referral services Ghose et al. (2007) analyzed how this innovation (digitally enabled lead generators in electronic markets) can direct consumer traffic to downstream retailers in a distribution network, reconfiguring traditional networks of upstream manufacturers and downstream retailers to include third-party or manufacturer-owned referral services and thus influencing how profits are realized in the market.

ICT-enabled innovations in interorganizational service delivery systems have in some cases radically restructured firm networks and markets. However, Dong et al. (2009) argued that technological resources alone do not predict the IT value, and that managerial skills for adapting supply chain processes and corporate IT strategy are even stronger predictors of firm performance and competitive position, particularly in highly competitive markets. Similarly, in a study of service platforms for ERP software, Sarker et al. (2012) explicated the performative implications of value cocreation through governance mechanisms, IT capabilities, knowledge transfer, and political and power dynamics that influence how different firms benefit from their participation in the platform. Such studies suggest the importance of resource integration (skills, knowledge, IT, etc.) to these service ecosystems and, indirectly, to the prospects for service innovation, which are themes highlighted in S-D logic.

## Technology

The IS research topics discussed thus far are motivated by and adopt the core assumption that information and computer technologies enable service innovation. Inspired by rapid developments of Internet and mobile computing technologies in the last decade, such as the Apple and Android mobile operating systems, social media platforms, and cloud computing services, IS researchers have more recently argued that digitization of information on a massive scale and the digital

infrastructures that collect, process, distribute, and utilize this information are allowing radically new (re)combinations of digital and physical components to produce novel products and services (Yoo et al. 2010). These digital infrastructures enable the generativity of the digital platform upon which many organizations are able to innovate (Cusumano 2012; Gawer and Cusumano 2008; Yoo et al. 2012; Zittrain 2006). As a key focus of innovation, digital platforms act as a foundation upon which other firms can develop complementary products, technologies, and services (Gawer 2009) as well as digital capabilities throughout the organization (Yoo et al. 2012).

Other IS research points to the role of standards as components of ICT infrastructures that facilitate (or inhibit) service innovation (Braa et al. 2007; Fishenden and Thompson 2012; Grisot et al. 2014; Lyytinen and King 2006; Steinfield et al. 2005). For instance, acknowledging the complexity of technology, institutions, and local contexts inherent to multi-regional service innovation, Braa et al. (2007) argued that flexible standards can bring order to large-scale information service innovation projects while also allowing adaptation to frequent changes and variation within developing countries. Grisot et al. (2014) argued similarly that cultivating flexible architectures, which can evolve over time and context to accommodate specific users' needs, can facilitate future innovation. To manage the inherent tension of generative potential with control in digital infrastructures, Ghazawneh and Henfridsson (2013) proposed that boundary resources, made up of "the software tools and regulations that serve as the interface for the arm's-length relationship between the platform owner and the application developer" (p. 174) provide diverse innovators with access to the core resources of the service system, thus stimulating generativity, while at the same time affording the firms that created the infrastructure some control over the digital ecosystem.

## New Directions and Contributions to Service Innovation in the Digital Age ■

Our synthesis of the IS literature highlights the variety of theoretical and empirical insights that have relevance for our understanding of service innovation in the digital age. However, as we reviewed IS publications that discuss notionally service and service innovation, we found that assumptions about *service* are for the most part implicit, and the implications of ICTs for service innovation are generally not articulated in an explicit manner. Instead the assumption is often that ICT-related change in organizations or markets is synonymous with innovation, and the expected outcomes of innovation—customer satisfaction, perceived quality, produc-

tivity, profitability, competitive advantage, and so on—are the primary focus of much of this literature (Ordanini and Rubera 2010) rather than the innovation per se. While these are important phenomena, we suggest that bringing assumptions about service and service innovation to the foreground of theorizing will help the IS field to build novel contributions to knowledge about service innovation. This special issue highlights four central themes to help us do so.

### **Applying the S-D Logic Framework to Service Innovation**

As we noted earlier, the S-D logic perspective develops a fundamental reconceptualization of service. In this perspective, the traditional conceptualization of *services* (usually plural) as a *unit of output* (i.e., an intangible product) are reconceptualized as *service* (singular), defined as “the application of specialized knowledge skills...for the benefit of customers” (Vargo and Lusch 2004, p. 2) in a process of joint and reciprocal cocreation of value between providers, beneficiaries, and others (e.g., other market-facing, public, and private actors). In S-D logic, service (not a product/good) is the *common denominator of all* economic (and, generally, social) *exchange*; when physical goods are involved, they are mechanisms for service provision. The benefit provided through service is *value*, that is, an increase in the viability of the system (e.g., individual, family, firm, customer, etc.) under consideration, which arises as actors in an exchange integrate their varied resources (Vargo and Lush 2004, 2008a, 2011b).

To more fully understand this resource-integration and service-provision process requires dispensing with the distinction between a *producer* (as a creator of value) and a *consumer* (as a receiver and destroyer of value) and adopting an *actor-to-actor* (A2A) perspective (Vargo and Lusch 2011a), in which all actors are engaged in the same, generic activities: resource-integration and service-for-service exchange. These activities are coordinated and assisted through the creation of *institutions*: norms, meanings, symbols, and institutional arrangements (constellations of integrated institutions) that guide cognitive and behavioral activities to facilitate collaborative value creation. These resource-integrating, service-exchange activities, coordinated through institutional arrangements for mutual value creation, establish *service-ecosystems*, formally defined as “relatively self-contained, self-adjusting system[s] of resource-integrating actors connected by shared institutional logics and mutual value creation through service exchange” (Lusch and Vargo 2014, p. 161).

In S-D logic, the key resources in exchange are *operant resources*, resources such as knowledge and skills, which can

be used to act on other resources in which the primary component is information to create value. This makes information the core, dynamic constituent of service ecosystems. In fact, Rust (2004, p. 24) argues that, since information drives service, “the service revolution and the information revolution are two sides of the same coin.” Similarly, Normann (2001) argues that it is advances in “liquification,” the ability to separate and transport information independently of people and materials (e.g., via digitization), along with being unable to unbundle specializations that are behind the revolutionary abilities to create new “densities” (configuration of resources) needed to innovate and solve problems. In short, it is becoming apparent that the *service revolution* is more of a *service revelation* (Vargo and Lusch 2011b). the realization that service has always been the basis of exchange, necessitated by *real revolutions in ICT*. This places ICTs (and digitization) and, specifically, information at the heart of innovation in service ecosystems and, generally, economic and social exchange.

It is becoming increasingly apparent that institutions and institutional arrangements are the all-too-often under-recognized, if not ignored, elements of innovation, both in the creation of technology and in the (re)formation of the markets in which it is exchanged (Sako 2009; Vargo and Lush 2014). For example, the institutionalization of the computer chip, a host of other compatible, specialized components, along with the institutionalization of cellular and Wi-Fi technology allowed the development of iPad, iPhone, and iPad technologies. Moreover, the institutionalization of user-generated “apps” was a central development in the success of the iPad, as compared to the failure of the Newton a few years previously. Arthur (2009) calls this progression in technological development “combinatorial evolution” but Vargo et al. (2013) point out that it takes place in market innovation as well as technological innovation and that in both technology and markets, innovation is, fundamentally, about institutional progression.

In their article, “Service Innovation: A Service-Dominant Logic Perspective,” Robert Lusch and Satish Nambisan draw from the growing body of S-D logic literature in the Marketing and Information Systems disciplines to articulate a framework focused on service innovation, which is “inherently network-centric, value and experience focused, and span[s] the tangible–intangible divide” (p. 157). Consistent with S-D logic arguments, *service* is understood to be a *process* rather than a unit of output that can be produced and consumed (p. 156), and *service innovation* is defined explicitly as the “*rebundling of diverse resources that create novel resources that are beneficial (i.e., value experiencing) to some actors in a given context*; this almost always involves a network of actors, including the beneficiary (e.g., the customer)” (p. 162). *Resources* are defined as “anything an actor



can draw on for support (Vargo and Lusch 2004)” (p. 159), including tangible goods and intangible resources such as skills. Knowledge as well as technology are key operant resources for service innovation (p. 160), which digitally enabled *service platforms* can *liquefy* (i.e., decouple from their original instantiation in physical form) and mobilize so as to be readily available to actors engaged in service exchanges (i.e., increasing *resource density*). *Actors* are defined generically as resource integrators, who *cocreate value* in *actor-to-actor (A2A) networks* (value cocreation networks) so that “innovation occurs as actors seek better densities and improved ways for value cocreation” (p. 161). *Value* is thus dynamic, experiential and contextual, rather than a unit of output or an embedded property of a good or service. *Value cocreation* entails effectual actors, including the beneficiary (e.g., a customer) acting purposefully within *service ecosystems*, defined as emergent A2A structures, with shared institutional logics, world views, mental frameworks, and so on that facilitate actors’ service exchange and cocreation of value (p. 161).

Lusch and Nambisan highlight a variety of research questions regarding service innovation as they direct our attention to three key dimensions of this framework: *service ecosystems*, *service platforms*, and *value cocreation*. Value cocreation is enacted within and enabled by service ecosystems, which provide the shared institutional logics and structures for resource integration and service exchange, whereas the service platform provides the modular structures of rules, protocols, and tangible and intangible resources that bring resources readily to hand to actors engaged in exchange. We highlight three conclusions that are particularly salient to our theme of service innovation in the digital age.

First, paralleling arguments for flexible standards in digital and IT infrastructures (see Braa et al. 2007; Ghazawneh and Henfridsson 2013; Henfridsson and Byzstad 2013), Lusch and Nambisan contend that service ecosystems require both structural flexibility and structural integrity:

While structural flexibility allows actors to have agency, structural integrity facilitates the structures that are created to impinge on the actors so they become more engaged and glued to one another (p. 164).

What binds actors together in service ecosystems are not standards or technologies however, but “a trinity of resources: competences, relationships, and information” (p. 164) that allow actors in the network to propose and engage in value exchanges.

Second, again paralleling arguments that layered, modular digital architectures are generative of innovation (Yoo et al.

2012; Yoo et al. 2010), Lusch and Nambisan propose that “in a layered–modular structure, the components represent a bundled set of specialized knowledge and skills appearing in the form of tangible or intangible components” (p. 164), which facilitate service exchange in a service platform. They posit that as modularity and granularity increase, opportunities for service innovation increase, and that digital technologies, as operant resources, are critical in this regard as they both liquefy and distribute resources through the A2A network but also allow actors to increase resource density to quickly access and utilize resources needed for service exchange.

Third, drawing from S-D logic, Lusch and Nambisan highlight three generic roles for customers (service beneficiaries) in service innovation: as *ideators*, who bring knowledge about their needs to a service exchange, as *designers*, who mix and match knowledge components and resources to configure services in use, and as *intermediaries*, who cross-pollinate knowledge across service ecosystems (p. 168). Digital technologies, serving as operand and operant resources, support actors’ knowledge exchange in these ways and facilitate emergent and situated service innovation. This perspective is consistent with IS research that has examined how IT enables knowledge exchange (as noted above) for professional workers but suggests a more multifaceted understanding of the information system user than is typical of studies of IS service quality or user satisfaction.

In their article, “The Value of Self-Service: Long-Term Effects of Technology-Based Self-Service Usage on Customer Retention,” Anne Scherer, Nancy Wunderlich, and Florian von Wangenheim draw on these enriched views of service platforms and service beneficiaries in service innovation. The digitally enabled roadside service offered by an automobile manufacturer provides the empirical basis to consider how service beneficiaries (customers) experience value cocreation in the context of different media channels. In contrast to prevailing views of self-service as primarily beneficial to the firm, Scherer et al. adapt the concepts of *value-in-context* and *value-in-use* (Vargo and Lusch 2004, 2008a) to consider the differential effects of self-service and personal service channels on customer loyalty over time. In S-D logic, value is specific to a service system and is determined “in use” or, specifically, in the *context* of other resources (such as knowledge, skills and ICTs) and through integration with them and application to them. Using S-D logic as a unifying theoretical framework, the authors argue that customers cocreate and realize value-in-use from the roadside service differently in different channels and that their experiences may shift over time (value-in-context). Through a longitudinal analysis of customer usage and loyalty data, they found that customers who used a mix of self- and personal-service channels were more likely to continue with

the service offering, commenting that “customers who experience the best of both worlds [i.e., the service provider’s self-service and personal-service offers] should be more likely to remain with their provider” (p. 184) than those who restrict themselves to a particular channel until the customer becomes familiar with the technology and the service provider’s basic value proposition. The authors suggest that findings “underline the importance of considering the different value propositions service providers offer in various channels and the unique value customers can derive from these propositions over time” (p. 193).

Along with unpacking different concepts around value and understanding how new forms of value emerge as service, S-D logic has usefully provided various concepts and rich insights on service innovation that resonate with recent developments in the IS literature. Of note, S-D logic has highlighted the importance of practices and the role of technology as an operant resource in service ecosystems for innovation (Akaka and Vargo 2014). IS research informed by practice theory has taken root in some areas of IS research. Next, we briefly elaborate some key developments in practice theory and suggest why they are particularly important for developing future work in service innovation.

### **Bringing a Practice Perspective to Service Innovation Research**

Service, and thus service innovation, increasingly involves a wide set of intersecting practices, which emerge in bundles of activities (Schatzki 2005) interrelated over time and across levels of social analysis. Practice theories have developed in various literatures that address how relationships among elements within practices are built and maintained and are interdependent (Østerlund and Carlile 2005). For instance, Reckwitz (2002, p. 149) offers a definition of *practice* as routinized types of behavior, which involve bodily activities, mental activities, objects, background knowledge, know-how, emotions, and so on. Individuals engage in many practices in their day-to-day activities, and enactments of routinized practices vary with each individual’s goals, skills, context, and other practices in which they engage. For instance, Orlikowski’s (2000) practice theory lens emphasizes the provisional and emergent ways in which technologies are enacted in day-to-day activities. *Shared practices* develop as agents (human and nonhuman) are oriented to each other in an interdependent manner, constantly modifying their habituated individual responses as they interact with others, in order to sustain a shared practice (Barnes 2001, p. 32).

Nicolini (2011) suggests that a practice seldom makes sense when considered in isolation but should be understood through the underlying web of relationships constituting a

phenomenon. In these and other relational views of practice in service provision (see Barrett et al. 2012; Oborn et al. 2011), theorists thus place everyday practices as the locus for the production and reproduction of relationships (Østerlund and Carlile 2005). For Orlikowski and Scott (2008), *relationality* with practices presumes that the social and the material are inherently inseparable or entangled. This relational practice perspective focuses our attention not only on the range of actors who may innovate in a service ecosystem but also emphasizes the practices that are being increasingly infused with technologies and other materialities. As such, service necessarily entails the entanglement of activities, bodies, and artifacts (Orlikowski and Scott 2015), which is enacted through (to some degree routinized) practices yet also emergent (by individuals in a setting and context). We see this entanglement, for instance, in Miscione’s (2007) analysis of telehealth services (noted earlier), in which an array of material assemblages beyond the ICT-enabled service per se (such as microscopes) were required for service to be enacted in the practices of remote and local healthcare providers.

Further, consider the variations of materiality and practices involved in the entertainment service of viewing a movie (Barrett and Davidson 2008). The practice of “going to the movies” involves people, theaters, screens, and projecting devices. The specific materialization of films, cameras, theater seats, and other patrons at a viewing influences how the service is developed and delivered (Orlikowski and Scott 2015), thus influencing how the service is enacted and experienced, individually and collectively, by movie viewers. The entertainment service of viewing a movie entails different materializations and different practices when we watch a movie in our homes using a video streaming service (such as Netflix). Variations in the possibilities for the movie entertainment service have widened in scope with the advances of digital innovation (e.g., from 2D to 3D technology), in color (e.g., black and white to Technicolor), sound (“surround sound”), and in the shifts to digital cinematography and CGI, digital audio, digital projection and distribution, and so on as the many related practices of producing, distributing, and viewing movies become entangled in these materialities.

We suggest that the practice approach to service innovation could usefully adopt a relational epistemology to socio-material practices (Orlikowski 2007) as well by considering the materiality of the relations that are woven together as a practice unfolds (Gherardi 2012), along with other interrelated elements of practice such as the emotive effects. For instance, drawing on Reckwitz’s (2002) conceptualization of practice, Oborn et al. (2011) suggest that *know-what* and *know-how* related to use of an IT artifact are embedded and interrelated with other elements of the practice and, importantly, to bodily movements and emotions. In our example of movie enter-

tainment service, the latter elements become important in a practice-based approach to understanding one of the most recent and potentially transformative service innovations: 3D movies. To what extent do the materialities of 3D movie viewing in practice give the viewer the impression that one can “reach out and touch” or that the movie is exerting a new form of agency and emotional control? This will have practical implications for the positive affect as to how viewers experience the movie depending on whether they are able to see 3D images effectively and to experience immersion effects of 3D or whether they feel adverse effects such as vertigo, headaches, or eyestrain.

Orlikowski and Scott, in their article “The Algorithm and the Crowd: Considering the Materiality of Service Innovation,” draw from the rich literature on practice theories and the emerging theorizations of sociomateriality (Barad 2003; Orlikowski 2007; Orlikowski and Scott 2008; Scott and Orlikowski 2012; Suchman 2007) to outline their perspective on service and suggest promising applications of this approach. A key assumption is that *service is constituted in peoples’ everyday practices*, which are defined as *recurrent, situated activities* informed by shared meaning (p. 203), as *dynamic* and *on-going*, and importantly as involving a range of *activities, bodies, and artifacts*. This leads to a second key assumption that *services are material*, in that to be realized, the service must be materialized in practice through the coordination of activities, bodies, and artifacts (p. 204). And third, Orlikowski and Scott propose that the *materialization of services (and goods) is performative*, so that the specific material enactments of service (or of a good) are *consequential* for the outcomes produced (p. 204). Drawing on the sociomaterial lens, they argue

services and service innovations are contextually situated and performative. This encourages us to examine how services are materialized in particular times and places through particular practices, and how this ongoing enactment configures specific boundaries, properties, meanings, and differences, and with what implications (p. 205).

Orlikowski and Scott illustrate the entanglements of material-discursive practices in service using the example of TripAdvisor, a user-generated travel review website, to highlight “two key elements that have enabled the service innovations underlying web services and social media: automated computations (algorithms) and large numbers of users (crowds)” (p. 210). Building on the insights of Galloway (2006), Zysman (2006), Callon and Muniesa (2005), and others, they argue that ranking and sorting algorithms impose a temporary ordering on information that requires “the items being compared are commensurable, standardized with stable

and defined properties that make comparability and calculation possible” (p. 211). This ordering “eradicates idiosyncrasies and conflates differences...that excludes vital relationships and context details” (p. 211). Innovation in web-based services relies not only on algorithms but also on the crowds that generate online content on social media platforms. Individuals in these crowds may be engaged actively or unwittingly and passively (e.g., through “big data” monitoring). Orlikowski and Scott conclude that

Accounting for the dynamics of the crowd in studies of service innovation would thus need to consider the material-discursive practices of content generation and distribution, the role and performance of algorithms in shaping these practices, and the mechanisms through which digital data on user behavior is captured, stored, and used to inform further automated processes, whether customization, recommendation, observation, or tracking (p. 213).

In parallel with this recognition of the increasing significance and importance of sociomaterial practices constituting service innovation are developments in the growing literature, which theorizes digital technologies and artifacts as platforms for innovation. Given the importance of digital innovation to service innovations in modern economies, considering the implications of digital innovation for service and service innovation explicitly is another key area for research on service innovation.

### **Theorizing Digital Artifacts and Innovation for Service Innovation**

While early work highlighted the role of ICT and a global digital infrastructure (Barras 1990) for service innovation long before the Internet arrived, the implications of the scale and scope of digital innovation that has occurred over the last 15 years on service and service innovation could scarcely be predicted. Digital innovation has been defined as new combinations of digital and physical components to produce new products (and services) by combining digital data from heterogeneous sources easily “to deliver diverse services, which dissolves product and industry boundaries” (Yoo et al. 2010, 726). As Barrett et al. (2012) note, increasingly there are hybrid digital innovations such as robots that have digital and mechanical elements as two distinct forms of materiality. Drawing on a tuning perspective (Pickering 1995), they demonstrate how the robot’s hybrid materiality entangles mechanical elements and digital inscriptions, and in so doing influence the organizing of the hospital pharmacy dispensing service by reconfiguring boundary relations between different occupational groups.

Recent IS literature has theorized digital artifacts as central to digital innovation and therefore significant in facilitating service innovation. Digital artifacts have been described as having an ambivalent ontology (Kallinikos et al. 2013), being intentionally incomplete and perpetually in the making (Garud et al. 2008; Zittrain 2008) and having a number of attributes depicted in the literature in similar yet distinctive ways (Faulkner and Runde 2009; Kallinikos et al. 2013; Yoo et al. 2010). For example, Kallinikos et al. (2013) note that as digital artifacts become increasingly embedded in wider and constantly shifting ecosystems, they become editable, interactive, reprogrammable, and distributed. Others have suggested that as digital artifacts diffuse, their properties become embedded or implicated in the making of a layered modular digital architecture that separates content from the underlying networks by virtue of homogenized data and instantiates the independence of services from devices and content. It is this condition of data homogeneity (or digitization) that opens up ample potential for innovation (Yoo et al. 2010), enabling the mixing of inputs/outputs across the traditional and usually fixed industry borders associated with standard physical products and vertical integration (Kallinikos et al. 2013). This hybrid architecture adds a layered component to recognize the degree to which, on a continuum, generativity is added to the modular architecture (Kallinikos et al. 2013; Yoo et al. 2010), in which generativity refers to the “overall capacity of a technology to produce unprompted change driven by large, varied, and uncoordinated audiences” (Zittrain 2006, p. 1980).

As Lusch and Nambisan (2015) highlight, ICTs have been recognized as playing a dual role as both an operand (enabler) and an operant (initiator or actor) resource for service innovation. For example, ICTs can foster service innovation by enabling the establishment of a value network and allow the sharing and integrating of resources and knowledge in that network. Additionally, ICTs are becoming increasingly a part of new offerings through digitization, which allows the technology to be an actor that triggers the innovation (Lusch and Nambisan 2015). An even more proactive and provocative vision is that digital innovation plays a key role in the resource integration within actor-actor networks in service ecosystems (Vargo and Lusch 2011a) to unleash the generativity referred to earlier by opening up innovation opportunities (Yoo et al. 2010) through resource integration.

Digital innovation also enables value creation through services and this has had a combinatorial effect in digital service ecosystems (Cusumano 2012; Yoo et al. 2012). This potential has perhaps been most dramatically demonstrated in professional IT firms such as Apple, which enjoyed spectacular growth from 25,000 apps downloaded a total of 800 million times in early 2009 to more than 700,000 apps downloaded 25 billion times by March 2012 (Tilson et al. 2012). This per-

spective of a digital service ecosystem as facilitating the exchange of service among loosely coupled heterogeneous actors through digital technology connects closely to an S-D logic perspective of a service ecosystem being “[a] spontaneously sensing and responding spatial and temporal structure of largely loosely coupled, value-proposing social and economic actors interacting through institutions, technology, and language to (1) co-produce service offerings, (2) engage in mutual service provision, and (3) co-create value” (Vargo and Lusch 2011a, p. 185).

In their paper in this special issue, “Distributed Tuning of Boundary Resources: The Case of Apple’s iOS Service System,” Ben Eaton, Silvia Elaluf-Calderwood, Carsten Sørensen, and Youngjin Yoo draw on S-D logic and sociomaterial practice approaches to further our understanding of the dynamics of digital service (eco)system. They build on earlier tuning approaches (Barrett et al. 2012; Pickering 1995) to address a key paradoxical tension that emerges between a logic of generativity and a logic of infrastructural control within service systems. Innovation in service systems with digital technologies are viewed as a sociotechnical assemblage of distributed, heterogeneous, and resource integrating actors governed by standards and shared institutional logic. However, in order to achieve value creation for service innovation, diverse actors in the ecosystem cannot effectively participate in generative innovation without boundary resources (e.g., software development kits, application programming interfaces) controlled by powerful firms. The focus, therefore, is on how heterogeneous actors engage in distributed tuning of boundary resources within the Apple iOS service system. This analysis goes beyond a more simplistic dialectic between large firms controlling infrastructure and third party developers innovating on that infrastructure. Instead, the aim is to advance our theoretical understanding by highlighting not only the enabling role of boundary resources but to recognize the ways they also resist actions by other heterogeneous actors. Repairing the contradictions and tensions that ensue within the ecosystem enable new forms of resource integration and service provision. For instance, “jailbreaking” (i.e., opening the mobile phone operating system (iOS) to allow unauthorized applications) emerged as part of the generative activity to overcome Apple’s autocratic control of its operating system platform, and this led to the service system that developed around this platform becoming more generative, as tensions between Apple, other firms, and application developers were resolved through continued cycles of jailbreaking and “patching” (i.e., adjustments to the iOS code) and the ongoing resolution of the boundary resources in the service system. In this way, the authors advance the theorizing of innovation in service systems by taking seriously the digital technologies and innovations that emerge in the distributed tuning of boundary resources.

This body of work focusing on digital innovation is critical for furthering our understanding of service innovation, although it is often addressed only from the perspective of large, global multinational corporations operating in a Western context. As we discuss next, the complementary developments on service innovation in emerging economies are equally exciting and insightful in furthering our knowledge of service innovation, challenging us to think beyond technological developments to consider the broader institutional and societal context of service innovation.

### ***Learning from Service Innovation in Emerging Economies***

Research on innovation in emerging economies is gaining ground in management studies generally and in fields such as strategy, information systems, and marketing (see George et al. 2012). Emerging economies are marked by two major characteristics that make them different from developed economies. First, these countries typically suffer from serious resource constraints across the board (Prahalad 2012; Radjou et al. 2012). They face shortages in finance, skilled labor, technology, water, and energy. A large majority of their citizens live outside the formal economy: they are unbanked, have low, volatile incomes, and lack access to clean energy (electricity), good education, and healthcare (Ernst et al. 2015). Second, these economies typically suffer from a lack of infrastructure and institutions such as well functioning capital, labor, and technology markets, courts, efficient bureaucracies and so on (Kahle et al. 2013).

These differences mean that innovation in emerging economies is often fundamentally different from that in developed economies in being more frugal, flexible, and inclusive (Radjou et al. 2012). The lack of resources means that innovators in emerging market contexts are very good at taking cost out of the entire innovation process and at making the most out of few resources. The unpredictable nature of the environment (due to political, economic, and social instability) means that innovators have to be flexible and capable of improvising new solutions to fit changing circumstances rather than stick to fixed, long-term plans. Finally, the fact that large numbers of people live and work outside the formal economy means that innovators must frequently think about how their innovations can be inclusive enough to reach such populations. Thus, while we may traditionally have viewed service innovation as a phenomena of developed economies that migrate to developing countries, we suggest that knowledge and insights on service innovation might also flow in the opposite direction.

For instance, the lack of well functioning institutions means that emerging economies frequently require innovators to be

institutional as well as business entrepreneurs (Khanna et al. 2005). Specifically, in addition to finding a way to make, distribute, sell, and maintain new products and services, innovators also need to find ways to plug institutional holes, for instance, by finding ways to enable unbanked consumers to be able to finance capital intensive goods, or by employing community members to help with distribution and maintenance in the absence of retail and after-sales infrastructure. An example is the microfinance/joint liability group model whereby community members (consumers) provide not only access to capital (by pooling their resources) but also act as collateral to each other when individual members take out loans from the self-help group. Another example is Unilever's Project Shakti which "employs" women from microfinance self-help groups to act as distributors of Unilever products in areas too remote for Unilever to set up formal distribution through their own or third party stores.

Scholars have noted that innovations for low-income, resources-constrained communities often involve changes to the delivery or business model rather than changes to technology per se. Existing, ubiquitous technologies (such as mobile phones and SMS/texting) are "hacked" to enable a service that would otherwise be too unaffordable or inaccessible for poor, remote communities to adopt and use. Examples of this include M-Pesa, the mobile payments solution introduced by Safaricom, a mobile service provider, in Kenya in 2007. By using ubiquitous mobile phones, text messaging software and local "mom-and-pop" shops (i.e., small, family-owned businesses) as agents, Safaricom is able to replicate a service that banks typically provide (being able to send money, for instance) but without having to set up the costly infrastructure that brick-and-mortar banking would require.

The case example of M-Pesa as a mobile service innovation also highlights the new scale and scope of complexity of the interactive innovation process (Barras 1990) whose technological trajectory is very much entangled in a sociomaterial manner (Orlikowski and Scott 2008) with ongoing and shifting technological, market, and institutional contexts. Further, the service development, which started off as micro-loans, emerged and developed as money transfer, took place as a global collaborative innovation process developing over time and across geographies. This exemplifies the complexity of service innovation as the development and implementation of ideas through multiparty networks and communities (Garud and Giuliani 2013). For example, M-Pesa developed as an innovative mobile money transfer service between small and large firms in both developed and emerging economies. It highlights the performative nature of service innovation in which emergent practices evolve to facilitate a wide range of quite unexpected services by different actors in the wider ecosystem (e.g., users, network agents, producers, etc.), and

has woven sociomaterially with the evolving technology and business model.

Service innovation in emerging economies thus relies not only on the generative mechanisms of digital infrastructures but equally (or even more so) on orchestration of social institutions and local resources in a service platform or ecosystem. In their article, “Bridging the Service Divide Through Digitally Enabled Service Innovations: Evidence from Indian Health Care Service Providers,” Shirish Srivastava and G. Shainesh illustrate this phenomenon as they extend the notion of the *digital divide* to that of the *service divide*, arguing

value-creating combinations do not arise solely through the presence of tangible resources owned by the service provider (social entrepreneur) and/or the service users (society), but are orchestrated through *value-creating interactions* across the provider and user systems (p. 246).

Bringing the S-D logic perspective to their longitudinal analysis of the development of two telehealth service innovations in rural India, this study focuses on three forms of interactional resources (*knowledge, technology, and institutions*) that are shared across a service system and orchestrated to develop sustainable value propositions for residents of poor, rural areas of India. Institutions are the socially and legally constructed entities that provide the framework for interactions between users and providers of the service (p. 249) and are essential components of service systems in which the ultimate beneficiaries of a service (here, rural Indian residents requiring eye care health services) lack the capacity to engage directly in an A2A network for service exchange.

Srivastava and Shainesh develop a process view of service innovation arising through the value creating mechanisms of resource exploitation, resource combination, and value reinforcement. Based on the empirical cases, they argue that knowledge is the key interactional resource during the idea and launch stage, followed by technology during the infancy and early growth stage, and that technology and institutions are both key to late growth and expansion stages. Four broad enablers of service innovation (p. 259)—*obsessive customer empathy* (focused on the user needs, desires, and resources), *belief in the transformational power of ICT*, *continuous recursive learning*, and *efficient network orchestration*—energize and motivate the progression of the service innovation as the service platform develops. Of note, Srivastava and Shainesh’s theoretical model identifies *accessibility* and *affordability* as the outcome measures of interest, rather than the more typical IS research focus on user satisfaction or perceived system quality. In this regard, they note the policy implications of using ICT tools in service innovations to address the service divide: as wealth increases, resource

distribution will be highly skewed without interventions that aim to mitigate unbalanced growth (p. 264). They conclude that “innovative leveraging of interactional resources can deliver sustainable if not profitable social solutions” (p. 264). In so doing, the authors contribute an understanding of service innovation as involving not only value-creating mechanisms and interactional resources including technology and knowledge but also highlight the need for customer empathy. We explore this theme in more detail below when we discuss the opportunities for future work to examine design thinking and related practice-based developments for developments on service innovation.

## Future Horizons for Service Innovation Research

Our goal for this special issue was to bring forward leading edge research from the IS and marketing literatures to inform our understanding of service and service innovation in this era in which digital innovation has become perhaps the single most powerful force for business and social innovation. We began by outlining the rich tapestry of research on innovation in the services economy, which has informed (indirectly or directly) IS thinking about service innovation. On this tapestry, we sketched some key IS research topics that implicitly or explicitly have contributed to our understanding of ICT-enabled service innovation. Bringing service and service innovation to the foreground, we highlighted four new perspectives/areas of focus that further our conceptual developments of service innovation, namely: the application of the S-D logic framework to service innovation, insights of practice theory-based developments on service, theorization of the role of digital artifacts and innovation for service innovation, and exploration of service innovations from emerging economies.

Our objectives in this introductory article were to set the stage for the articles in this special issue and to motivate readers to appreciate and to build on these important contributions. We suggest that the four perspectives outlined here and developed in articles in this special issue can inform further research in the IS field on service innovation and that, individually and in combinations, they may help the IS field focus and strengthen its contributions to this important topic. For instance, the S-D logic perspective would suggest that algorithms act as operant resources (similar to knowledge and IT) to increase the resource density of knowledge captured in user-generated reviews and thus are generative of service innovation. Sociomateriality foregrounds the material-discursive practices of algorithms and of crowds in producing and utilizing these resources through service enactments. Both perspectives effectively build on recent work in marketing, information

systems, and organizational theory to challenge us to articulate and, as we do so, to reconsider our assumptions about the nature of service and service innovation.

To conclude, we highlight possible paths forward with research in the IS field on service innovation in the digital age, each of which could draw on the perspectives developed in this special issue as well as traditional approaches to addressing service innovation. Our discussion reflects the challenge that Constantinides et al. (2012, p. 16) pose about the “ends” of IS research:

a systematic questioning not only about the largely dominant focus on the theoretical and methodological choices made by researchers, but also about the ethical methods of conduct around how and for whom we should act, the anticipated and desired outcomes of the research, the collective and long-term impact of the research for the communities we wish to serve and inform, and the ways in which our choices are fostered, shaped, and restricted by power relations.

Here we consider two specific ends that future IS research on service innovation might serve and how our choices of research topics, methods, and outlets might influence our ability to contribute to these ends.

The first is to consider how service innovation theory informs and may be applied in the design of services, of service systems, and of service ecosystems. If social and economic practices are to be transformed by the service and digital innovations highlighted in this special issue (as is commonly assumed), we suggest that the IS research field has not only abundant opportunities for further study but also a practical and ethical imperative to develop research that may guide and inform the practice of service design. Information system design is one key foundation of IS practice, and the IS field has expertise in design. As we discussed earlier, IS researchers are tackling important topics, such as the characteristics of infrastructures and of digital platforms that foster service innovation—for example, layered and modular architectures for technology platforms (Neely 2008; Yoo et al. 2010) and flexible standards for IT infrastructures (Braa et al. 2007; Cusumano 2012; Henfridsson and Byzstad 2013; Lyytinen and King 2006; Zittrain 2006).

What we are suggesting, however, goes beyond these and other influential design approaches such as participatory design and computer-supported cooperative work (e.g., Ehn 1988; Suchman 1996) to an active engagement with practices in *designing for service* (Kimbell 2011a). This approach has emerged as both a critique and further theorization of design thinking (Brown 2008; Brown and Wyatt 2010), which is an

influential approach to problem solving deemed important for innovation in contemporary business and in engaging with a wide range of services and social problems (Kimbell 2011b). Design thinking adopts a largely human-centered approach, recognizing an iterative process that moves from generating insights about end users to idea generation and testing to implementation (Brown 2008, Kimbell 2011b). Underpinning human-centered design is the empathy by which designers are able to understand and interpret the perspectives of end users and the problems they face. While valuable, we suggest that future researchers in designing for service should adapt a design thinking approach to incorporate the key tenets of the practice approach to service innovation as discussed earlier. Very much in line with Kimbell (2012), our perspective would view design as a situated, local accomplishment involving diverse and multiple actors and that recognizes the role of digital artifacts and other materialities constituting practices. Further, consistent with both an S-D logic and a relational practice approach, the designer would be de-centered as being the main agent doing the designing. Rather, the focus would include actors across the wider service (eco)system (Vargo et al. 2013), including managers, employees, customers, end users, and materiality which take part in the design. Design, therefore, becomes a situated and distributed unfolding in which diverse actors, their knowing, doing, and saying, along with various things are involved (Kimbell 2012). As we briefly discussed with M-Pesa, designing for service around money transfer in Kenya was a distributed unfolding involving Vodafone, Sagentia, and Safaricom as key innovation actors, along with microfinance agents and users who participated in pilots on micro-loans. These, along with the material traces of activity on the mobile networks, were important elements of the design activity that allowed for understanding end user behaviors in valuing the practice of money transfer. This approach for designing service views design as not only including the materials and objects that are part of these activities but also the discursive practices on money transfer, such as “Send Money Home” which emerged for M-Pesa, making possible certain value propositions and excluding others. Designing for service is, therefore, an exploratory process that aims to create new kinds of value relations between diverse actors within a socio-material configuration (Kimbell 2011a; Orlikowski and Scott 2015).

Another path forward is to consider more broadly (and consistently) where and how our field may contribute to societal improvements through our research on service innovation. Our field of research has long been fascinated by large IT firms and “the next big thing” in IT (Baskerville and Myers 2009). Without question, these topics present many important and worthy phenomena to address. However the “service divide” addressed by Srivastava and Shainesh (2014) suggests

that without the commitment to addressing service innovations, large populations in developing economies will not benefit from the digital era. On the other hand, these settings offer many opportunities for both the research and practice of service innovation in a digital age. First, because they often lack the physical infrastructure to deliver key social services such as education and health to large numbers of people in remote areas, emerging economies frequently employ digital technologies to deliver these services in a frugal, yet effective, way. It is no surprise, therefore, that countries such as South Africa are at the forefront of developments in mobile health, while Kenya is at the forefront of mobile financial services. Increasingly, large companies such as IBM, Cisco, GE, Siemens, and Microsoft are using emerging economies as labs in which to develop, test, and scale service innovations using digital technologies. Much of this research is increasingly led out of large research and development centers in places like Bangalore (India), Shanghai (China), and, more recently, Nairobi (Kenya).

Finally, because emerging economies are fundamentally different from their Western counterparts in their institutional and economic structure, these economies offer researchers an opportunity to extend and modify management theories that have typically been built around developed economy conditions. To the extent that extant theories based on Western economies work off assumptions that do not hold for emerging economies, studying service innovation in a digital era in emerging countries can help reshape what we know about technology, business, and society. Further, emerging economies provide the opportunity for researchers to engage in methodologically novel research. Because emerging countries frequently do not have legacy technologies or systems, in many areas of service innovation and digitization they leapfrog more developed countries as they put into place state-of-the-art infrastructure from scratch. This allows researchers to study phenomena such as the adoption and use of new technologies in communities that are engaging with such artifacts of modernity for the first time. This in turn enables researchers to conduct randomized control trials that compare the adoption and use of certain types of digitally enabled services in a treatment sample against an equivalent control group that does not receive the treatment (and may often not have been exposed to any kind of related technological innovation in the past). In cases where randomized control trials may be hard or expensive to conduct, rapid policy changes in emerging markets makes it possible to exploit natural experiments comparing areas of groups where the new legislation applies to equivalent groups beyond the jurisdiction of such change. All in all, emerging markets and their unique conditions offer interesting opportunities for researchers and companies alike in the area of service innovation and digital technologies.

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The response to this special issue indicates the importance of and interest in this topic from the Information Systems and Marketing fields. We received 85 submissions to the special issue. Some otherwise promising papers were screened due to their fit with the goals of the special issue. Approximately 30 percent of submissions underwent a full review process by a community of 20 associate editors and nearly 100 reviewers, who were drawn from the two disciplines. The five papers published in this special issue were shaped and refined by their authors with the assistance of this community through additional review rounds. As Guest Senior Editors, we would like to extend our heartfelt thanks to the anonymous members of this community of scholars who dedicated their time and expertise to the process. We would like to acknowledge, in particular, the associate editors, many of whom hold editorial positions at *MIS Quarterly* and other top journals in the IS and Marketing fields and who contribute substantial effort to editorial processes, for their support of the special issue. We would also like to thank Corinna Frey for her research assistance on the literature review for this article.

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